



the spring 116 has an adjacent coil 138 adjacent the end coil 132, the end coil 132 has a flat 140 defining the tang 136, and the tang 136 has a free end 142 which overlaps the adjacent coil 138. In one design, the flat 140 is a three-sided flat (i.e., the end coil 132 is shaped to form three flat sides of a square with the fourth "side" of the "square" being curved as seen in Figure 3). In other designs, not shown, the flat is a one or two-sided flat. In one variation, the pump piston 112 has a circumferential taper 144 contacting the spring 116 between the attached and biasing portions 124 and 126 of the spring 116. In one construction, the free end 142 of the tang 136 of the end coil 132 of the spring 116 does not overextend the adjacent coil 138 of the spring 116 either by having the free end 142 under-extend the adjacent coil 1318 such as by having the free end 142 extend generally half way to where it would overlap the adjacent coil 138 or, as shown in Figure 3, by having the free end 142 overlap but not protrude beyond the adjacent coil 138. This facilitates attachment of the spring 116. During attachment, the spring 116 is moved against the first piston end 118 whereby the end coil 132 first expands against the circumferential taper 144 and then contracts when it reaches the circumferential groove 134 with the tang 136 becoming disposed in the circumferential groove 134. In one construction, the spring 116 consists essentially of spring steel.

In a further example, not shown, the spring has a plurality of spring fingers extending longitudinally outward from, and extending radially inward from, a circular base. The base is attached to the pump piston. The fingers contact and bias the pump check valve to fluidly block the piston bore. Other spring designs are left to the artisan.

In one implementation, the pump piston 112 is a vehicle controlled-breaking-system pump piston. Other implementations of the pump piston 112 are left to those skilled in the art.

In a first expression of a second embodiment, as seen in Figure 4, the pump piston 212 has threads 246, and the attached portion 224 of the spring 216 is threaded onto the threads 246. In a first expression of a third embodiment, as seen in Figures 5 and 6, the pump piston assembly 310 also includes a clip 348

surrounding the attached portion 324 of the spring 316 and disposed in the circumferential groove 334 of the pump piston 312. In one design, the clip 348 is a "C" clip (as shown in Figure 6). In another design, not shown, the clip is an